

TABLE OF CONTENTS

SUMMARY	S-1
1.0 INTRODUCTION	1-1
1.1 Background.....	1-1
1.1.1 The Proposed Action.....	1-2
1.1.2 The Origin of TEP’s Proposal: TEP’s Business Plan and the Proceedings of the Arizona Corporation Commission	1-10
1.2 Purpose and Need.....	1-13
1.2.1 TEP’s Purpose and Need.....	1-13
1.2.2 Federal Agencies’ Purpose and Need Statements.....	1-13
1.3 The Alternatives Considered.....	1-15
1.4 The Federal Agencies’ Preferred Alternatives	1-17
1.4.1 DOE’s Preferred Alternative	1-18
1.4.2 USFS’ Preferred Alternative	1-18
1.4.3 BLM’s Preferred Alternative.....	1-18
1.4.4 USIBWC’s Preferred Alternative	1-19
1.5 TEP’s Proposed Project Capacity and Usage.....	1-19
1.6 NEPA Process and Public Participation	1-20
1.6.1 Public Scoping.....	1-20
1.6.2 Scoping Comments	1-20
1.6.3 Draft EIS Public Review and Comment Period.....	1-23
1.6.4 Major Comments Received on the Draft Environmental Impact Statement ...	1-24
1.6.5 Changes from the Draft Environmental Impact Statement	1-24
1.6.6 Next Steps	1-26
2.0 PROPOSED ACTION AND ALTERNATIVES	2-1
2.1 Alternatives	2-1
2.1.1 Western Corridor	2-3
2.1.2 Central Corridor.....	2-10
2.1.3 Crossover Corridor	2-14
2.1.4 No Action Alternative.....	2-18
2.1.5 Alternatives Considered But Eliminated from Further Analysis	2-19
2.2 Activities Common to All Action Alternatives.....	2-24
2.2.1 Substation Upgrades and Additions and Fiber-Optic Regeneration Sites	2-24
2.2.2 115-kV Interconnection of the Gateway and Valencia Substations.....	2-26
2.2.3 Transmission Line Structures and Wires.....	2-26
2.2.4 Transmission Line Construction.....	2-27
2.2.5 Operation and Maintenance.....	2-34
2.2.6 Standard Mitigation	2-35
2.3 Comparison of Alternatives	2-38

3.0	AFFECTED ENVIRONMENT	3-1
3.1	Land Use and Recreation.....	3-1
3.1.1	Land Use	3-1
3.1.2	Recreation.....	3-9
3.2	Visual Resources	3-19
3.2.1	Western Corridor	3-20
3.2.2	Central Corridor.....	3-28
3.2.3	Crossover Corridor	3-30
3.2.4	115-kV Interconnection of the Gateway and Valencia Substations.....	2-32
3.3	Biological Resources	3-33
3.3.1	Biodiversity	3-33
3.3.2	Vegetation and Wildlife	3-34
3.3.3	Special Status Species	3-40
3.3.4	Migratory Birds and Raptors	3-56
3.3.5	Coronado National Forest Management Indicator Species	3-57
3.3.6	Invasive Species	3-58
3.4	Cultural Resources	3-60
3.4.1	Archaeological and Historical Sites	3-60
3.4.2	Native American Concerns	3-64
3.5	Socioeconomics.....	3-70
3.5.1	Population and Housing	3-70
3.5.2	Employment and Income	3-71
3.5.3	Community Services	3-72
3.5.4	Revenues for Forest-Based Activities	3-72
3.5.5	Tourism	3-73
3.6	Geology and Soils	3-74
3.6.1	Geology	3-74
3.6.2	Soils	3-79
3.7	Water Resources.....	3-84
3.7.1	Floodplains, Wetlands, and Surface Water	3-84
3.7.2	Groundwater.....	3-91
3.8	Air Quality	3-93
3.8.1	Climate	3-93
3.8.2	Air Quality.....	3-94
3.9	Noise.....	3-98
3.9.1	Background	3-98
3.9.2	Western, Central, and Crossover Corridors.....	3-98
3.9.3	115-kV Interconnection of the Gateway and Valencia Substations.....	3-100
3.10	Human Health and Environment	3-101
3.10.1	Electric and Magnetic Fields	3-101
3.10.2	Corona Effects.....	3-103

3.11	Infrastructure.....	3-105
3.11.1	Utilities and Facilities	3-105
3.11.2	Waste Management.....	3-105
3.12	Transportation.....	3-107
3.12.1	Western Corridor	3-107
3.12.2	Central Corridor.....	3-111
3.12.3	Crossover Corridor	3-111
3.12.4	115-kV Interconnection of the Gateway and Valencia Substations.....	3-112
3.13	Minority and Low-Income Populations.....	3-113
3.13.1	Western, Central, Crossover Corridors, and 115-kV Interconnection of the Gateway and Valencia Substations	3-114
4.0	ENVIRONMENTAL EFFECTS.....	4-1
4.1	Land Use and Recreation.....	4-1
4.1.1	Land Use	4-1
4.1.2	Recreation.....	4-8
4.2	Visual Resources.....	4-19
4.2.1	Western Corridor	4-22
4.2.2	Central Corridor.....	4-45
4.2.3	Crossover Corridor	4-51
4.2.4	115-kV Interconnection of the Gateway and Valencia Substations.....	4-54
4.2.5	Summary of Visual Impacts	4-55
4.2.6	No Action Alternative	4-56
4.3	Biological Resources	4-57
4.3.1	Biodiversity	4-57
4.3.2	Vegetation and Wildlife	4-58
4.3.3	Special Status Species	4-61
4.3.4	Migratory Birds and Raptors	4-72
4.3.5	Coronado National Forest Management Indicator Species	4-74
4.3.6	Invasive Species	4-75
4.4	Cultural Resources	4-77
4.4.1	Archaeological and Historical Sites	4-77
4.4.2	Native American Concerns	4-79
4.5	Socioeconomics.....	4-81
4.5.1	Western, Central, and Crossover Corridors.....	4-82
4.5.2	No Action Alternative	4-85
4.6	Geology and Soils	4-86
4.6.1	Geology	4-86
4.6.2	Soils	4-89
4.7	Water Resources.....	4-91
4.7.1	Floodplains, Wetlands, and Surface Water	4-91

4.7.2	Groundwater.....	4-95
4.8	Air Quality	4-97
4.8.1	Emissions	4-97
4.8.2	Clean Air Act Conformity Requirements.....	4-99
4.8.3	PM ₁₀ Contributions from Transmission Line Construction in Mexico	4-106
4.9	Noise.....	4-107
4.9.1	Western Corridor	4-108
4.9.2	Central Corridor.....	4-110
4.9.3	Crossover Corridor	4-111
4.9.4	115-kV Interconnection of the Gateway and Valencia Substations.....	4-112
4.9.5	No Action Alternative.....	4-112
4.10	Human Health and Environment.....	4-113
4.10.1	Electric and Magnetic Fields	4-113
4.10.2	Corona Effects.....	4-121
4.10.3	Safety of Co-Locating a Transmission Line and a Pipeline	4-122
4.11	Infrastructure.....	4-124
4.11.1	Utilities and Facilities	4-124
4.11.2	Waste Management.....	4-125
4.12	Transportation	4-127
4.12.1	Western Corridor	4-127
4.12.2	Central Corridor.....	4-130
4.12.3	Crossover Corridor	4-131
4.12.4	115-kV Interconnection of the Gateway and Valencia Substations.....	4-132
4.12.5	No Action Alternative	4-132
4.13	Environmental Justice	4-133
4.13.1	Western, Central, and Crossover Corridors and 115-kV Interconnection.....	4-133
4.13.2	No Action Alternative	4-135
5.0	CUMULATIVE IMPACTS	5-1
5.1	Methodology	5-1
5.2	Reasonably Forseeable Action Identification	5-1
5.2.1	Other Energy and Transmission Line Projects in Southern Arizona	5-1
5.2.2	Industrial Development.....	5-2
5.2.3	Trade Corridor/Roadway Development	5-2
5.2.4	Additional Activities in the Project Area	5-3
5.2.5	Power Plants in Mexico	5-5
5.3	Cumulative Impacts Analysis	5-6
5.3.1	Land Use and Recreation	5-6
5.3.2	Visual Resources	5-7
5.3.3	Biological Resources	5-7
5.3.4	Cultural Resources	5-8

5.3.5	Socioeconomics	5-8
5.3.6	Geology and Soils	5-9
5.3.7	Water Resources	5-9
5.3.8	Air Quality.....	5-10
5.3.9	Noise	5-11
5.3.10	Human Health and Environment	5-11
5.3.11	Transportation.....	5-14
5.3.12	Environmental Justice	5-14
5.3.13	Additional Cumulative Impact Concerns Specific to the Coronado National Forest	5-14
5.4	Cumulative Impacts Analysis Summary.....	5-15
6.0	UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS	6-1
7.0	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES.....	7-1
8.0	SHORT-TERM USE AND LONG-TERM PRODUCTIVITY	8-1
9.0	APPLICABLE ENVIRONMENTAL LAWS, REGULATIONS, PERMITS, AND DOE ORDERS	9-1
10.0	LIST OF AGENCIES AND PERSONS CONTACTED	10-1
11.0	REFERENCES	11-1
12.0	ACRONYMS & ABBREVIATIONS, UNITS CONVERSION CHART, GLOSSARY	12-1
13.0	LIST OF PREPARERS AND CONTRIBUTORS	13-1
14.0	INDEX	14-1
15.0	DISTRIBUTION LIST	15-1

LIST OF APPENDICES

APPENDIX A: CONSULTATION LETTERS	A-1
APPENDIX B: ELECTRIC AND MAGNETIC FIELDS BACKGROUND INFORMATION	B-1
APPENDIX C: FLOODPLAINS AND WETLANDS ASSESSMENT	C-1
APPENDIX D: FINAL BIOLOGICAL ASSESSMENT, WESTERN CORRIDOR AND USFWS BIOLOGICAL OPINION (ON ATTACHED CD-ROM).....	D-1
APPENDIX E: FINAL BIOLOGICAL ASSESSMENT, CENTRAL CORRIDOR (CD ROM).....	E-1
APPENDIX F: FINAL BIOLOGICAL ASSESSMENT, CROSSOVER CORRIDOR (CD ROM).....	F-1

APPENDIX G: NEPA DISCLOSURE STATEMENTS FOR PREPARATION OF THE TUCSON ELECTRIC POWER COMPANY SAHARITA-NOGALES TRANSMISSION LINE ENVIRONMENTAL IMPACT STATEMENT.....	G-1
APPENDIX H: AMENDMENTS TO THE LAND AND RESOURCE MANAGEMENT PLAN FOR THE CORONADO NATIONAL FOREST	H-1
APPENDIX I: USFS VISUAL IMPACTS REPORTS	I-1
APPENDIX J: ARIZONA CORPORATION COMMISSION DOCUMENTS	J-1
APPENDIX K: FINAL BIOLOGICAL ASSESSMENT, 115-KV INTERCONNECTION (CD ROM). K-1	

LIST OF FIGURES

Figure 1.1–1	Proposed Project Region Map	1-4
Figure 1.1–2	Proposed Project Study Corridors	1-5
Figure 1.1–3	Monopole Transmission Line Structure Drawing and Photo.....	1-6
Figure 1.1–4	Lattice Tower Transmission Line Structure Drawing and Photo.....	1-7
Figure 1.1–5	Gateway to Valencia 115-kV Transmission Line	1-8
Figure 2.1–1	Close-up of Alternative Study Corridors Near Sahuarita and Green Valley	2-4
Figure 2.1–2	Close-up of Alternative Study Corridors Near Amado	2-5
Figure 2.1–3	Close-up of Alternative Study Corridors Near Nogales	2-6
Figure 2.1–4	Western Corridor on the Coronado National Forest.....	2-8
Figure 2.1–5	Central Corridor on the Coronado National Forest.....	2-13
Figure 2.1–6	Crossover Corridor on the Coronado National Forest.....	2-15
Figure 2.1–7	TEP Corridor Alternatives, Alternatives Eliminated From Further Analysis.....	2-20
Figure 2.2–1	Proposed Construction Equipment.....	2-30
Figure 3.1–1	Specially Designated Areas on the Coronado National Forest	3-5
Figure 3.1–2	Recreation Opportunity Spectrum Classes on the Coronado National Forest	3-11
Figure 3.2–1	Typical Desert Grasslands Vegetation in the Coronado National Forest	3-21
Figure 3.2–2	Scenic Attractiveness Classes for Tumacacori EMA	3-22
Figure 3.2–3	Travelways of Concern within and Near Tumacacori EMA	3-24
Figure 3.2–4	Scenic Classes for Tumacacori EMA.....	3-25
Figure 3.2–5	Coronado National Forest Existing Scenic Integrity.....	3-26
Figure 3.2–6	Existing Utility Infrastructure	3-27
Figure 3.2–7	El Paso Natural Gas Pipeline ROW	3-29
Figure 3.3–1	Biotic Communities in the Proposed Project Area.....	3-35
Figure 3.3–2	Mexican Spotted Owl Critical Habitat Designation	3-49
Figure 3.3–3	Mexican Spotted Owl Critical Habitat Designation	3-53
Figure 3.3–4	Mexican Spotted Owl Critical Habitat Designation	3-55
Figure 3.6–1	Geology of the Proposed Project Area	3-75
Figure 3.6–2	Geology of the Proposed Project Area on the Coronado National Forest	3-77
Figure 3.6–3	Exposed Bedrock Along the Western Corridor	3-78

Figure 3.6–4	Exposed Soil Along the Central Corridor.....	3-79
Figure 3.6–5	Soil Associations in the Proposed Project Area.....	3-80
Figure 3.7–1	Surface Waters Outside the Coronado National Forest.....	3-85
Figure 3.7–2	Surface Waters and Watersheds Within the Coronado National Forest.....	3-86
Figure 3.7–3	500- and 100-year Floodplain and Associated Surface Waters Crossed by the Corridor Alternatives	3-88
Figure 3.8–1	Wind Rose of Surface Winds at Tucson.....	3-95
Figure 3.8–2	Nogales PM ₁₀ Non-attainment Area and Tucson CO Maintenance Area.....	3-96
Figure 3.11–1	Existing Utility Infrastructure	3-106
Figure 3.12–1	Roads Within the Tumacacori EMA	3-110
Figure 3.13–1	Meaningfully Greater Minority Populations.....	3-115
Figure 3.13–2	Low-Income Populations.....	3-116
Figure 3.13–3	Detail of Block Group Boundaries for Populated Areas	3-117
Figure 4.2–1	Western Corridor on the Coronado National Forest Visibility and Simulation Key Map	4-40
Figure 4.2–2	Predicted Scenic Integrity of the Western Corridor	4-42
Figure 4.2–3	Western and Crossover Corridors Outside the Coronado National Forest Visibility and Simulation Key Map	4-44
Figure 4.2–4	Visual Sensitivity Map	4-46
Figure 4.2–5	Central Corridor on the Coronado National Forest Visibility and Simulation Key Map	4-47
Figure 4.2–6	Predicted Scenic Integrity of the Central and Crossover Corridors	4-49
Figure 4.2–7	Central Corridor Outside the Coronado National Forest Visibility and Simulation Key Map	4-50
Figure 4.2–8	Crossover Corridor on the Coronado National Forest Visibility and Simulation Key Map	4-52
Figure 4.10–1	Electric Field Strength for Normal Operating Conditions, Optimized Phasing.....	4-116
Figure 4.10–2	Magnetic Field Strength for Normal Operating Conditions, Optimized Phasing	4-117

LIST OF VISUAL SIMULATIONS

Visual Simulation 1: Western Corridor from Upper Thumb Picnic Area at Peña Blanca Lake Area.....	4-23
Visual Simulation 2: Western Corridor from Ruby Road west of the Calabasas Group Area.....	4-24
Visual Simulation 3: Western Corridor along Ruby Road north of Pajarita Wilderness.....	4-25
Visual Simulation 4: Western Corridor and Castle Rock from Ruby Road.....	4-26
Visual Simulation 5: Western Corridor Crossing Ruby Road	4-27
Visual Simulation 6: Western Corridor from Ruby Road west of the Tumacacori Mountains	4-28
Visual Simulation 7: Western Corridor from Ruby Road west of the Tumacacori Mountains	4-29
Visual Simulation 8: Example of Terrain and Vegetation Shielding Along the Western Corridor	4-30
Visual Simulation 9: All Three Corridors on BLM Land.....	4-31
Visual Simulation 10: Western and Crossover Corridors Crossing Arivaca Road	4-32
Visual Simulation 11: Central Corridor Crossing of Ruby Road.....	4-33
Visual Simulation 12: Central Corridor Crossing of Ruby Road.....	4-34
Visual Simulation 13: Central Corridor Crossing from Peck Canyon at I-19.....	4-35
Visual Simulation 14: Central Corridor Crossing Arivaca Road.....	4-36
Visual Simulation 15: Central Corridor Northwest of Tubac	4-37
Visual Simulation 16: Example of Partial Terrain Shielding Along Central Corridor	4-38
Visual Simulation 17: Central Corridor Near Piedra Drive in Tubac.....	4-39

LIST OF TABLES

Table 2.1–1	Comparison of Existing and Amended Forest Plan Text for Proposed Western Corridor	2-10
Table 2.1–2	Comparison of Existing and Amended Forest Plan Text for Proposed Central Corridor	2-14
Table 2.1–3	Comparison of Existing and Amended Forest Plan Text for Proposed Crossover Corridor	2-18
Table 2.2–1	Typical Personnel and Equipment for Transmission Line Construction	2-28
Table 2.2–2	TEP Mitigation Practices Included in the Proposed Action	2-35
Table 2.3–1	Summary Comparison of Potential Environmental Effects of Alternatives	2-45
Table 3.2–1	Visual Attributes of the Western, Central, and Crossover Corridors	3-21
Table 3.3–1	Biotic Communities Present in the Western Corridor	3-37
Table 3.3–2	USFS Classified Riparian Areas in the Western Corridor	3-37
Table 3.3–3	Biotic Communities Present in the Central Corridor	3-38
Table 3.3–4	USFS Classified Riparian Areas in the Central Corridor	3-38
Table 3.3–5	Biotic Communities Present in the Crossover Corridor	3-39
Table 3.3–6	USFS Classified Riparian Areas in the Crossover Corridor	3-39
Table 3.3–7	Comparison of Special Status Species Potentially Occurring in Each of the Corridors	3-41
Table 3.3–8	Federally Listed Species Potentially Occurring in Pima and Santa Cruz Counties	3-44
Table 3.3–9	USFS Sensitive Species Potentially Occurring in the Western Corridor	3-50
Table 3.3–10	BLM Sensitive Species Potentially Occurring in the Western Corridor	3-50
Table 3.3–11	AGFD Wildlife of Special Concern Potentially Occurring in the Western Corridor	3-51
Table 3.3–12	Plants Protected by Arizona Native Plant Law that are Potentially Occurring in the Western Corridor	3-51
Table 3.3–13	Birds Species Listed under the Migratory Bird Treaty Act that Are Likely to Occur in the Western, Central, and Crossover Corridors by Vegetation Type	3-57
Table 3.3–14	Management Indicator Species (MIS) Occurring on the Coronado National Forest and Reasons for Selecting Project-Level MIS	3-58
Table 3.4–1	Tribal Officials Contacted by DOE in Project Scoping	3-65
Table 3.5–1	Historic and Projected Population	3-70
Table 3.5–2	Region of Influence Housing Characteristics	3-71
Table 3.5–3	Employment by Sector (Percent)	3-71
Table 3.5–4	Region of Influence Unemployment Rates (Percent)	3-72
Table 3.6–1	Richter Scale	3-76
Table 3.8–1	Climate Data for Tucson, Arizona	3-93
Table 3.8–2	Criteria Pollutant Attainment Status in Proposed Project Area	3-97
Table 3.9–1	Comparative A-Weighted Sound Levels	3-99
Table 3.10–1	EMF Level of Some Common Household Appliances	3-102
Table 3.13–1	Pima County Census Block Groups On and Near the Corridors	3-118
Table 3.13–2	Santa Cruz County Census Block Groups On and Near the Corridors	3-119
Table 4.1–1	Approximate Structure Land Use	4-3
Table 4.1–2	Example of ROS Indicator Matrix for Facilities and Site Management	4-9
Table 4.1–3	Impacts to Setting Indicators in the Roaded Natural ROS Class in the Western Corridor	4-10
Table 4.1–4	Impacts to Setting Indicators in the Roaded Modified ROS Class in the Western Corridor	4-10
Table 4.1–5	Impacts to Setting Indicators in Semi-Primitive Motorized ROS Class in the Western Corridor	4-11

Table 4.1–6	Impacts to Setting Indicators in Semi-Primitive Non-Motorized ROS Class Area $\frac{1}{4}$ Mile from the Western Corridor	4-12
Table 4.1–7	Impacts to Setting Indicators in the Roaded Natural ROS Class in the Central Corridor	4-12
Table 4.1–8	Impacts to Setting Indicators in the Semi-Primitive Motorized ROS Class in the Central Corridor.....	4-13
Table 4.1–9	Impacts to Setting Indicators in the Semi-Primitive Non-Motorized ROS Class $\frac{1}{4}$ Mile From the Central Corridor	4-13
Table 4.1–10	Impacts to Setting Indicators in Semi-Primitive Motorized ROS Class in the Crossover Corridor.....	4-14
Table 4.1–11	Impacts to Setting Indicators in Semi-Primitive Non-Motorized ROS Class in the Crossover Corridor	4-15
Table 4.1–12	ROS Impacts Summary for the Western, Central, and Crossover Corridors on the Coronado National Forest	4-17
Table 4.2–1	Summary of Reduced Scenic Integrity on the Coronado National Forest.....	4-55
Table 4.3–1	Estimated Area of Vegetation Communities Potentially Disturbed in the Western Corridor	4-59
Table 4.3–2	Estimated Area of Vegetation Communities Potentially Disturbed in the Central Corridor	4-60
Table 4.3–3	Estimated Area of Vegetation Communities Potentially Disturbed in the Crossover Corridor.....	4-61
Table 4.3–4	Effects Determination of Threatened and Endangered Species Potentially Occurring in Pima and Santa Cruz Counties, Arizona.....	4-64
Table 4.3–5	Impacts to Forest Service Sensitive Species	4-65
Table 4.3–6	Comparison of Potential Impacts to Habitat Within Coronado National Forest Lands for Management Indicator Species for Each Alternative.....	4-76
Table 4.7–1	Estimated Impacts to Floodplains by Alternative	4-92
Table 4.8–1	Regulatory Threshold Emission Rates for PM ₁₀ and CO	4-100
Table 4.8–2	Regionally Significant Action Level for PM ₁₀ and CO	4-101
Table 4.9–1	Peak Attenuated Noise Levels (dBA) Expected from Construction Equipment.....	4-108
Table 4.9–2	Example of Maximum Combined Peak Noise Level from Bulldozer, Jackhammer, and Scraper	4-109
Table 4.10–1	EMF Strength for Normal Operating Conditions (250 MVA Current, 345-kV Double Circuit).....	4-114
Table 4.10–2	EMF Strength for Maximum Operating Conditions (500 MVA Current, 345-kV Double Circuit).....	4-115
Table 4.12–1	Temporary and Permanent Area Disturbed on the Coronado National Forest by the Proposed Project	4-129
Table 5.3.8–1	Health-Based Ambient Air Standards	5-12
Table 5.3.8–2	Border Air Quality Data – Monitor Values Report	5-13
Table 5.4–1	Summary Comparison of Cumulative Impacts	5-16
Table 9–1	List of Potentially Required Permits/Approvals	9-1
Table 9–2	Federal Environmental Statutes, Regulations, and Orders	9-3
Table 10–1	DOE and TEP Consultations	10-1
Table 10–2	Summary of Consultation Letters	10-2